E/CONF.39/B/15
5 Oct. 1962
ORIGINAL : ENGLISH

UNITED NATIONS CONFERENCE
ON THE APPLICATION OF SCIENCE AND TECHNOLOGY
FOR THE BENEFIT OF THE LESS DEVELOPED AREAS

Agenda Item: B.3. Netherlands

INTEGRATED PLANT SURVEY

By A.W. SISSINGH, M.Sc.,
Eng. Staffmember,
Research Institute for
Management Science,
Delft, (Netherlands)

Papers have been contributed to the United Nations Conference on the Application of Science and Technology for the Benefit of the Less Developed Areas as working papers for that Conference. They are published as presented by the contributors, and the contents and the views expressed are those of the contributors. (See notes overleaf.)

NOTES

1. Papers selected for inclusion in General Sessions will be available at the Conference in the following official languages of the United Nations: English, French, Russian and Spanish.

2. Papers selected for inclusion in Specialized Sessions will be available at the Conference in only one of the above official languages.

3. Summaries of all papers, as submitted by contributors, will be available at the Conference in the following official languages of the United Nations: English, French, Russian and Spanish.

4. Papers and summaries will not be available for general distribution in advance of the Conference. They will be published in advance in limited quantities only for the use of delegations of participating governments and of other authorized participants. Post-Conference publication and general distribution of the Conference Proceedings will follow United Nations practices as laid down by the United Nations Publications Board.

INTEGRATED PLANT SURVEY

by
A.W. Sissingh, M.Sc. Eng.
Staffmember, Research Institute for Management Science, Delft (Netherlands)

INTRODUCTION

1. Integrated Plant Survey (IPS) may be defined as the evaluation of existing conditions in a small industrial enterprise, indicating its weak as well as its strong points. As within the scope of this paper the application of IPS is primarily directed towards small enterprises, a definition of small-scale industry seems indicated.

2. A small industrial enterprise is a manufacturing unit, also including repairs and services, the manager of which performs personally all important managerial functions and is moreover in daily contact with the workers, without taking himself an active part in the workers' tasks; such enterprises are not in the position to employ specialists on a permanent basis, in contrast with medium-sized and big industries, which are able to follow closely developments in the field of technology and scientific management by having at their disposal, either temporarily or permanently, specialist-staffmembers in the various fields.

3. In the process of industrialization small industry plays an important role in any country and of course a much more important one in newly developing countries.

Importance of Integrated Plant Survey for Small-scale Industry

4. It is of paramount importance that small industry too be in a position to profit by new developments in technology and scientific management. This can be achieved either by indicating to them in which fields introduction of scientific management is possible, by pointing out additional training possibilities for all levels of management and in general by overcoming objections against making use of expert assistance.

5. Before a small industrialist, however, will be able to take any decisions in the afore-mentioned fields, it will be necessary:
- to analyse and define correctly the problems existing in the enterprise, and
- to arrange the existing problems in the sequence of relative priority.

6. Experience has shown that managers of small enterprises are usually taken up by their daily tasks to such a degree that there is no time available for studying, classifying and solving all kinds of problems. The following observations made in a great number of small industries in the Netherlands may be taken as an additional indication why in many cases some outside assistance appears necessary:
. managers of small industries are often unable to gain a clear insight into their future requirements;
. in many cases managers simply do not want to face their own problems ("there are none so blind as those who will not see");
. managers have insufficient knowledge of existing and new techniques and new developments in general;
managers often evaluate their own position incorrectly;

. management is inclined to disguise certain facts, either intentionally or unconsciously;
. for small industrialists existing problems are often too complex and interlocked.

7. The foregoing elucidates in the author's opinion the need for and importance of IPS as a form of assistance to small industry.

8. The objectives of Integrated Plant Survey are:
. to make a diagnosis of the actual position indicating weak as well as strong points of the enterprise;
. to define correctly the existing problems and to indicate their relative priority;
. to indicate which problems and/or shortcomings can be overcome by the firm's own staff, either directly or with some outside assistance (e.g. training of some staffmembers), and which problems will require outside expert assistance within the scope of the firm's financial resources;
. to overcome objections against making use of expert assistance.

9. In this way a round development of small industries will be furthered by enabling management to consider its future medium-term policy.

A comparison of Integrated Plant Survey with a medical check-up

10. will serve to elucidate the actual meaning of the former. A human being may present itself to a medical board either because it feels unwell or for a general medical check-up (integrated survey). The medical board will either establish some living rules (action to be taken by the firm itself) or, in more serious cases, will refer the person to his family physician and/or to a specialist (outside expert assistance). Although a human being might consider itself quite healthy, some hidden illness (intentional or unconscious disguising) may be detected e.g. stomach trouble caused by bad teeth (complexity and interlocking of problems).

Application

11. IPS can be carried out by various organizations. The small entrepreneur will have to take the initiative by asking for such a survey to be made or certain special organizations may draw the industrialist's attention to this specific form of outside assistance.

12. Such an organization could be for instance an existing extension service for small-scale industry; even if the extension worker should be called in by the entrepreneur for the investigation of a special problem, it may be advisable that the extension worker starts with making an IPS, in order to place this special problem within the frame of the whole enterprise and to decide then whether this specific problem really is the most important one for the firm.

13. Other bodies which might handle IPS to their advantage are the industrial banks; especially in newly developing countries these banks are broadening their activities on behalf of small industry by setting up management consultancy departments. If small industries are applying for a loan, the bank will be enabled to judge more accurately the merits of such an application and the safety of the loan eventually to be granted by executing or having executed an IPS; by the results of such a survey the bank can at the same time provide the applicant with a combination of technical information (e.g. utilization of existing machinery) and information on commercial (e.g. marketing) and financial matters (e.g. influence of increased or improved production on profits and adaptation of the term of a loan and the rate of repayments to the situation of the enterprise).

14. An IPS might also be carried out upon the request of governmental bodies such as import licence offices. Applications for import licences for

machinery and/or raw materials can be judged in a much better way by conducting an IPS; thus reliable information can be obtained whether the existing machine capacity is fully utilized, the goods to be produced are really saleable on the market, the required skill to perform the necessary work is available and whether the management is capable of running the enterprise in an efficient way.

15. If IPS is applied in a great number of enterprises the needs of the industry in a certain region and/or in certain industrial branches might be determined and quantified, which will prove very useful in establishing long-term governmental industrialization policy in developing countries. Determination of specific needs of a branch of industry (e.g. training) as sole objective can of course be arrived at by a more simple industrial survey.

16. A large number of IPS executed in the same branch of industry must not be confused with "interfirm comparison"; in the latter case the objective is to collect pertinent data of a large number of firms in the same branch of industry and by comparing these data to establish the relative position of each firm within the whole branch.

EXECUTION OF THE INTEGRATED PLANT SURVEY

17. The execution of IPS comprises the following successive steps: observation, evaluation and reporting.

Observation

18. The observation consists of the recording of the actual position of the enterprise. The investigator has to record all the characteristic data of the enterprise as a whole, covering all its sectors (production, marketing, financing and personnel). In general it will be sufficient to record only rough data; only if symptoms and recordings indicate potential bottlenecks, a further and more detailed study will be required. Existing recording techniques of scientific management such as time study, worksampling, lay-out and routing, market covering analysis etc. are applied.

19. In the production sector a distinction has to be made between firms producing only one type of product ("line production"), enterprises with a production programme of similar products ("process flow production") and "single piece production", including repairs and service; combinations of these three types of industries will of course occur.

20. In the first and second type of industry the main points to be checked are whether workstations are situated in the right sequence of operations and whether the different capacities of workstations are adequately balanced. Moreover, attention should be paid to a continuous flow of material, prevention of machine breakdowns and minimizing change-overs of jobs of operators.

21. In the third type of industry (single piece production) the points to be stressed are the ratio "direct work - indirect work" and the time utilisation of individual workers and machines.

22. In all enterprises attention has to be paid to quality aspects, while it has to be ascertained whether the right type of cost calculation is used. In "batch-" and "mass-production" the cost calculation system in use must provide the opportunity to check the profitability per type of product, while in single piece production the profitability calculation per order must be possible.

23. In the marketing sector a different approach will have to be used for producers of "industrial goods" or "consumer goods". Regarding industrial goods some of the items to be recorded are: analysis of regular customers, knowledge about potential buyers, delivery times, etc. In the case of consumer goods moreover special attention will have to be paid to route planning for the salesmen, visiting frequencies, costs per visit, market covering.

24. It has to be ascertained whether sufficient attention is being paid to

the importance of small versus big orders from the costprice point of view, both in the production and marketing sector.

25. In the financial sector the main data to be recorded and studied are balance sheets and profit and loss accounts, preferably over the last three consecutive years. The liquidity position of the firm has also to be looked into.

26. In the personnel sector organization charts have to be drawn up as well as turnover diagrams and instruction-time-tables, etc.

27. For practical reasons the actual survey has to be done in as short a time as possible, in connection with the presumably limited availability of investigators, and the costs per survey. Experience in the Netherlands has shown that the actual observations in the factory can be limited to 2 - 3 man-days. The following measures can be taken in order to speed up the investigation proper and to decrease the costs of the whole survey:

- to request the firm to provide already before the actual investigation all data already available such as balance sheets with profit and loss accounts, list of personnel, data regarding machinery and equipment, eventually lay-out and details regarding sales.
- to instruct the personnel of the enterprise to prepare certain data in a specifically indicated way; such instructions followed by an explanation about the interpretation of the data gained in this way constitute a complementary training for the firm's personnel, so that the firm itself, after completion of the survey, will be able to continue to make such recordings and to analyse the respective findings.

Evaluation

28. From the findings in the different sectors of the enterprise as well as from the administrative and informative procedures observed conclusions have to be drawn. The conclusions are made for the various items of each sector.

29. It may happen that certain symptoms observed in one sector indicate an undesirable situation in another sector. Observations may for instance show that a machine is not fully utilized; the reason may be:

. idle time because materials are not available at the appropriate time (faulty purchasing policy, deficient inventory control);
. an unsufficient number of workers is available (personnel planning);
. unsufficient stock of orders (marketing);
. "down time" because of bad maintenance (production);
. overcapacity in order to maintain a flexible set-up of the firm (in case of repair and service enterprises).

In all aforementioned cases, with exception of the last one, the symptom of underutilization indicates a deficiency, while in the last case this underutilization may very well constitute a strong point of the firm.

30. The integrated final evaluation is obtained by combining the findings of each sector. The following rating is applied for each item:

"improvement necessary": immediate attention is considered urgent;
"improvement desirable": improvements are expected to result in cost savings, increase of production or other tangible results;
"reasonable": due to prevailing circumstances improvements cannot be expected to lead immediately to tangible results;
"satisfactory": the strong points of the enterprise; regular attention to these points is recommended.

These ratings indicate the priority of actions to be undertaken.

31. "Improvement necessary": neglecting the points under this heading will result within a relatively short period to a dangerous situation regarding the profitability and even the continuity of the firm.

In the Netherlands such points concern mostly financial (liquidity, too much

short and lack of sufficient own capital and long-term loans etc.) and marketing aspects (high costs of small orders, decrease of market-share in a growing market etc.).

32. "Improvement desirable": this rating comprises the items, the strengthening of which by appropriate action according to calculations and reasonable expectations will entail expenditure inferior to expected results. These aspects mostly concern production (improvement of lay-out and working methods) and marketing (improvement of selling procedures, market covering analysis).

33. "Reasonable": the estimated expenditure for improvement would at present exceed the results. Action does not seem indicated at present. Typical examples in this respect are encountered in the personnel sector (recruitment and selection procedures) and to a lesser extent in other sectors (e.g. statistical quality control can only be initiated with the assistance of a quality expert, which is not feasible for small enterprises).

34. "Satisfactory": mentioning the strong points of the firm is advisable for psychological reasons (moral support by not only mentioning deficiencies and weak points); on the other hand continuous attention has to be given to these points in order to strengthen them. These items sometimes constitute the real "selling points" of the firm (e.g. short delivery times in a repair shop).

Reporting

35. The drawing up of a report to be submitted to management of a small enterprise requires careful attention. In order to be readable and understandable the report has to be concise, so that it can be read in about 15 minutes. The wording has to be simple and clear and specific scientific terminology has to be avoided. It is therefore recommended to limit the report itself, containing the overall conclusions, to 3 - 5 pages of typescript and to present a summary of these conclusions in an evaluation diagram; a part of such a diagram is shown below:

Figure I

Sector	Item	A	B	C	D
Production	Machine utilization		▨		
	Quality aspects			▨	
	Production system and lay-out		▨		
	Cost calculation system	▩			
Marketing	Sales method			▨	
	Profitability of orders				▩

A = improvement necessary
B = improvement desirable
C = reasonable
D = satisfactory

36. The arguments sustaining the conclusions are presented per sector in annexes, each of which not exceeding 3 pages. The annexes have to be self-explanatory, so that the management is enabled to transmit specific annexes to the functionaries concerned without having to make them acquainted with the contents of the overall report.
A list of names and addresses of outside experts, research information centres and to pertinent literature may be attached to the report.

37. After a suitable interval the report is discussed with the management in order to give orally additional information and clarification and to make sure that report and conclusions are understood and correctly interpreted.

658 E - Oct. 1962 - 1,600